

WHAT IS CLAIMED IS:

1. A barrier operator for moving a barrier  
5 between open and closed positions with respect to a  
barrier opening, comprising:  
  
a light pattern generator to project an optical  
pattern across the barrier opening;  
  
an imaging device to observe a portion of the  
10 barrier opening as illuminated by the optical pattern;  
and  
  
a controller coupled to the imaging device to sense  
when the optical pattern in the observed portion of the  
barrier opening changes, and generating a detection  
15 signal in response thereto.
2. The barrier operator of claim 1, comprising  
apparatus for periodically recording images detected by  
the imaging device.
3. The barrier operator of claim 2, wherein the  
20 controller periodically compares an observed pattern  
detected by the imaging device with a digital  
representation of a non-obstacle pattern previously  
detected and recorded.
4. The barrier operator of claim 3, wherein the  
25 non-obstacle pattern is a substantially straight line.

5. The barrier operator of claim 1, wherein the digital imaging device observes the barrier path at an angle to the scanning device.

6. The barrier operator of claim 1, comprising an  
5 alarm device to generate an alarm indication in response to the detection signal.

7. The barrier operator of claim 6, wherein the alarm indication is an audible signal.

8. The barrier operator of claim 6 wherein the  
10 alarm indication is a visual signal.

9. The barrier operator of claim 1, comprising a barrier drive unit for

moving the barrier, and wherein the controller is responsive to the detection signal to control the  
15 barrier drive.

10. The barrier operator of claim 1, wherein the light pattern generator comprises:

a source of electrical energy;

a laser diode; and

20 an optical lens to focus a beam generated by the laser diode.

11. The barrier operator of claim 1, wherein the imaging device is a CCD camera.

12. The barrier of claim 1, wherein the light  
25 pattern generator is disposed on the barrier.

13. The barrier operator of claim 1, comprising a head unit with a motor for moving the barrier, and the imaging device is disposed on the head unit.

14. A system for detecting an object, comprising:

5 a light pattern generator projecting a light pattern beam across a defined area and producing a light pattern in the defined area;

a digital imaging device for detecting the light pattern produced by the light pattern generator; and

10 a controller having a memory with a stored image of a non-obstruction pattern detected in the defined area as produced by the light pattern generator; and

the controller periodically compares said image stored in the memory with the light pattern detected by  
15 the imaging device produced by the light beam shining across the defined area and recorded by the digital imaging device.

15. The system of claim 14, wherein, when the controller detects a difference between the digital  
20 representation of the light pattern produced by detecting the defined area and the image stored in a memory, the controller initiates an alarm.

16. The system of claim 14, wherein the image stored in the memory is of a substantially straight line

produced by the pattern generator in absence of an object in the defined area.

17. The system of claim 16, wherein the digital imaging device is a CCD camera, which is installed at an  
5 off-set angle from the laser device.

18. A method of detecting an object in a defined area using a light pattern generator and a digital imaging device, comprising steps of:

projecting a beam from the light pattern  
10 generator across the defined area and producing an optical pattern;

observing with a digital imaging device the optical pattern at an off-set angle to the projected beam;

15 storing in a memory an image of a non-obstruction pattern produced by projecting the pattern across the defined area in absence of an obstacle;

detecting by the digital imaging device a present optical pattern;

20 periodically comparing the present optical pattern with the stored image; and

producing a control signal when the present optical pattern differs from the stored image in the memory as a result of an obstruction in the defined area.

19. The method of claim 18, comprising generating  
5 an alarm signal responsive to the control signal.

20. The method of claim 18, comprising controlling a movement of a barrier in the defined area in response to the control signal.

21. A barrier operator for moving a barrier along  
10 a barrier path between open and closed positions comprising:

a light pattern generator to project an optical beam across the barrier path;

an imaging device to observe the barrier path as  
15 illuminated by the optical beam; and

a controller coupled to the imaging device to sense an obstacle illuminated by the optical beam.

22. A barrier operator for moving a barrier  
between open and closed positions with respect to a  
20 barrier opening comprising:

a light pattern generator to project an optical beam across the barrier path, said light pattern generator having the ability to be enabled and disabled;

an imaging device to observe the barrier opening;

a controller coupled to the imaging device to detect an enabled image of the barrier opening while the light pattern generator is enabled and to detect a disabled image of the barrier opening while the light  
5 pattern generator is disabled and generating a detection signal in response to the enabled and disabled images.

23. A method of detecting an object in a defined area using a light pattern generator and a digital imaging device, comprising steps of:

10 projecting a beam from the light pattern generator across the defined area;

observing with a digital imaging device an optical illumination in the defined area;

storing in a memory an image of a non-obstruction  
15 optical illumination produced by projecting the pattern across the defined area in absence of an obstacle;

detecting by the digital imaging device a present optical illumination pattern;

periodically comparing the present optical  
20 illumination pattern with the stored image; and

producing a control signal when the present optical illumination pattern differs from the stored image in the memory as a result of an obstruction in the defined area.

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24. The method of claim 23, comprising generating  
an alarm signal responsive to the control signal.

25. The method of claim 23, comprising controlling  
a movement of a barrier in the defined area in response  
5 to the control signal.

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